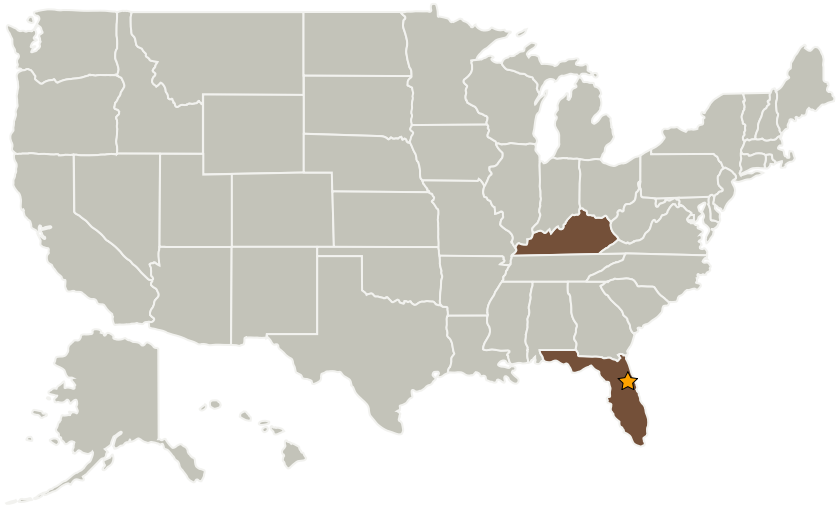
Passive Wireless Multi-Sensor Temperature and Pressure Sensing System Using Acoustic Wave Devices, Phase II

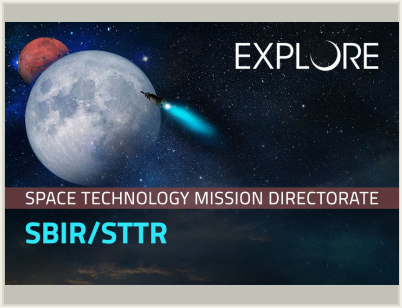
Completed Technology Project (2005 - 2007)

Project Introduction

This proposal describes the continued development of passive, orthogonal frequency coded (OFC) surface acoustic wave (SAW) sensors and multi-sensor systems, an enabling technology for remote wireless sensing of temperature, pressure, and a range of other measurands, for application to space explorations' demanding environments. Phase I demonstrated the technical feasibility of the OFC approach to produce passive solid-state SAW sensors that can be interrogated remotely using RF signals, and that respond with a signal that encodes both the sensor's identity and temperature measurements. OFC SAW temperature sensors similar to those demonstrated in Phase I are capable of operating over temperature ranges not possible with silicon, from cryogenic to 1,000oC. The spread-spectrum nature of the system proposed herein, which consists of multiple passive OFC SAW sensors interrogated remotely using chirped RF signals, provides increased processing gain and greater communication security. The proposed Phase II effort will develop and characterize prototype OFC SAW temperature sensors targeted to selected NASA and commercial applications, and demonstrate pressure sensors. The transceiver design will be optimized given the SAW operating parameters, conventional and innovative wafer-level packaging approaches (for devices capable of withstanding extreme environments) will be developed, and a complete breadboard wireless multi-sensor system will be demonstrated.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
Microsensor Systems Inc.	Supporting Organization	Industry	Bowling Green, Kentucky

Primary U.S. Work Locations	
Florida	Kentucky

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX13 Ground, Test, and Surface Systems
  - TX13.2 Test and Qualification
    - TX13.2.7 Test Instruments and Sensors